

November 12, 2003

Mr. G. A. Kuehn, Jr.  
Vice President SNEC and  
Program Director SNEC Facility  
GPU Nuclear, Inc.  
Route 441 South  
P.O. Box 480  
Middletown, PA 17057-0480

SUBJECT: NRC INSPECTION REPORT NO. 50-146/2003-201

Dear Mr. Kuehn:

This letter refers to the on-site inspection conducted on March 26 - 28, 2003 by NRC and a NRC contractor at your Saxton Nuclear Experimental Facility and telephone conversations held on April 9, April 23, May 1, May 13, June 18, and July 9, 2003 to discuss your Final Status Survey (FSS) report for the Containment Vessel Interior, 774' Elevation and Below. This survey unit is the first in a series to be released in accordance with the Saxton License Termination Plan (LTP) approved by the NRC on March 28, 2003

The inspection included an in-process review of your radiological FSS survey. In addition, NRC conducted an independent survey in parallel with your survey and collected samples from the piles of processed backfill for laboratory analysis.

The NRC inspector conducted selective examinations of procedures and representative records, interviews with personnel, and observations of activities in progress. The inspector determined that the Final Status Survey was conducted in accordance with the recommendations of the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) and requirements in the LTP. The results demonstrated that the survey unit met the release criteria established by the LTP.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at (the Public Electronic Reading Room) <http://www.nrc.gov/NRC/ADAMS/index.html>.

Mr. G. A. Kuehn, Jr.

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Should you have any questions concerning this inspection, please contact Mr. Thomas Dragoun at 610-337-5373.

Sincerely,

**/RA/**

Patrick M. Madden, Section Chief  
Research and Test Reactors Section  
New, Research and Test Reactors Program  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

Docket No. 50-146

License No. DPR-4

Enclosure: NRC Inspection Report No. 50-146/2003-201

cc w/enclosures: Please see next page

Saxton Nuclear  
Experimental Corporation

Docket No. 50-146

cc:

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Mr. G. A. Kuehn, Jr.

-2-

November 12, 2003

Should you have any questions concerning this inspection, please contact Mr. Thomas Dragoun at 610-337-5373.

Sincerely,

**/RA/**

Patrick M. Madden, Section Chief  
Research and Test Reactors Section  
New, Research and Test Reactors Program  
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U. S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION

Docket No: 50-146

License No: DPR-4

Report No: 50-146/2003-201

Licensees: GPU Nuclear/ FirstEnergy Corporation and  
Saxton Nuclear Experimental Corporation

Facility: Saxton Nuclear Experimental Facility

Location: Saxton, PA

Dates: March - September, 2003

Inspector: Thomas F. Dragoun

Approved by: Patrick M. Madden, Section Chief  
Research and Test Reactors Section  
New, Research and Test Reactors Program  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

## EXECUTIVE SUMMARY

Saxton Nuclear Experimental Facility  
Report No. 50-146/2003-201

The focus of this inspection was the on-site, in-process review of the Final Status Survey (FSS) of the Containment Vessel (CV) Interior, 774' Elevation and Below, and the processing of material to be used as clean backfill.

### Final Status Survey

- The FSS for the CV Interior, 774' Elevation and below satisfied the requirements in the LTP.

### Backfill Processing

- Within the scope of this review, the processing of previously excavated material for use as clean backfill was satisfactory.

## REPORT DETAILS

### **Summary of Plant Status**

About 8,400 tons of soil and concrete was pulverized and surveyed in preparation for its use as clean backfill in the Steam Plant excavation. About 2,677 tons of concrete was removed from the interior of the CV leaving only the steel shell and reinforcing rings installed to prevent collapse. Licensee HP technicians and some contractor personnel were supporting the preparation and conduct of FSS surveys of the CV interior surface and completing minor remediation.

### **1. Final Status Survey**

#### **a. Inspection Scope (Inspection Procedure [IP] 40755)**

The inspector reviewed the following to ensure that the requirements of the LTP were being met:

- Saxton Nuclear Experimental Corporation Facility License Termination Plan, Revision 2, dated December 2002
- Final Status Survey Report for Saxton Nuclear Experimental Corporation CV Interior, 774' Elevation and Below, Revision 1, dated September 4, 2003
- SNEC Facility Radiological Controls Final Status Survey Training Manual, Revision 0, undated
- Radiological Instrumentation Quality Assurance Report, Saxton Nuclear Experimental Corporation, January 1, 2002 - December 31, 2002
- Calculation, "Multiple Source Term Bounding Calculation", calculation No. 6900-02-025, dated October 7, 2002
- Calculation, "E900-03-03, CV Interior, 774' Elevation and Below, FSS Survey Design", draft Revision 0, dated March 7, 2003
- Procedure No. E900-IMP-4520.04, "Survey Methodology to Support SNEC License Termination", Revision 5, dated June 18, 2003
- Procedure No. E900-ADM-4500.64, "Post Remediation Isolation", Revision 1, dated March 15, 2003
- Procedure No. E900-IMP-4520.03, "Establishing a Reference Coordinate Grid System", Revision 0, dated July 9, 1999
- Procedure No. E900-ADM-4500.59, "Final Status Survey Planning and DQA", Revision 0, dated February 5, 2003
- Procedure No. E900-ADM-4500.60, "Final Status Survey Report", Revision 0, dated March 12, 2003
- Procedure No. E900-ADM-4500.39, "Chain of Custody for Samples", Revision 4, dated April 17, 2002
- Procedure No. E900-IMP-4520.05, "SNEC Site Calibration Check for the GFPC", Revision 0, dated January 22, 2003
- Procedure No. E900-IMP-4520.06, "Survey Unit Inspection in Support of FSS Design", Revision 0, dated January 29, 2003
- Procedure No. E900-QAP-4220.01, "Quality Assurance Program for Radiological Instruments", Revision 4, dated July 30, 2001

#### **b. Observations and Findings**

In order to safely access the empty CV interior surfaces for lead paint removal and FSS surveys, the licensee scheduled the first FSS survey for the bottom hemispherical head



“bowl” of the CV. After the FSS for this area demonstrated that the area could be released for unrestricted use, the licensee backfilled with crushed stone and covered the stone with impervious fabric to create a level surface protected in accordance with Post Remediation Isolation (PRI) requirements. The surface allowed for the placement of scaffolding and man lifts for safe access to the remaining CV surface. The survey report included the results from areas under the steel I-beams that were installed earlier to reinforced the CV against collapse. The licensee installed the I-beams “at-risk” subject to final NRC acceptance of the FSS.

Independent NRC measurements using similar portable radiation survey meters were co-located and conducted simultaneously with the licensee personnel. The results are presented in Table 1. Within a reasonable band of error for readings near background, the NRC and licensee data agree. Survey techniques used by licensee Technicians were observed and found acceptable. In addition, direct observation and field interviews regarding the survey requirements confirmed adequacy of technician training and understanding of survey requirements.

Reviews of the initial FSS report dated April 24, 2003, by the NRC indicated that the survey unit met the release criteria and the licensee was verbally notified of these results. This area was a Class 1 area and the survey was correctly designed for this classification in accordance with the recommended MARSSIM process. The NRC's review of the FSS Report resulted in several comments (see Attachment 1) to clarify the presentation of the survey data and corrections to the technical discussions. However, the conclusion that the survey unit satisfied the release criteria was unaffected. The licensee incorporated the changes requested by the NRC into Revision 1 of the FSS report dated September 4, 2003.

c. Conclusions

The FSS for the CV Interior, 774' Elevation and Below satisfied the requirements in the LTP.

**2. Backfill Processing**

a. Inspection Scope

The inspector reviewed the radiation monitoring of the previously excavated dirt, concrete, and stone that was being crushed, sifted, placed on a conveyor belt, and run under sensitive radiation detector probes, and placed in piles.

b. Observations and Findings

A computer displayed the radiation level and gamma ray spectrum of the pulverized material as it passed by in a thin layer on a moving conveyor belt. The naturally occurring radioactive isotope potassium 40 was monitored continuously and used to assure the proper calibration radiation spectrum display was maintained and the detectors were operating properly. The computer could trigger a diversion of the conveyor belt if a high radiation level was detected. Contractor personnel stated that the alarm was set at 0.9 picoCuries per gram. The inspector noted that this is conservative.

Laboratory analysis of split samples indicated agreement between the on-site lab and ORISE. These results are presented in Table 2.

c. Conclusions

Within the scope of this review, the processing of previously excavated material for use as clean backfill was satisfactory.

**3. Exit Interview**

The on-site portion of the inspection scope and results were summarized on March 28, 2003, with members of licensee management. The inspector described the areas inspected and discussed in detail the inspection findings. The results of the review of the amended FSS report was discussed by telephone on September 15, 2003. No dissenting comments were received from the licensee.

## **PARTIAL LIST OF PERSONS CONTACTED**

### **Licensee**

J. Byrne, SNEC Engineering Manager  
A. Paynter, SNEC Radiation Safety Officer  
W. Stoner, SNEC Radiological Engineering  
M. Williams, SNEC D&D Engineering

### **Independent Inspector**

R. Granlund

### **NRC Contractor**

T. Bauer, Assistant Project Leader, ORISE

## **INSPECTION PROCEDURES USED**

IP40755            Class III NonPower Reactors

## **ITEMS OPENED, CLOSED, AND DISCUSSED**

### **Opened**

None

### **Closed**

None

### **LIST OF ACRONYMS USED**

CFR	Code of Federal Regulations
CV	Containment Vessel
DQA	Data Quality Assurance
GFPC	Gas Flow Proportional Counter
LTP	License Termination Plan
ORISE	Oak Ridge Institute of Science and Education
PRI	Post Remediation Isolation
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
FSS	Final Status Survey
NRC	Nuclear Regulatory Commission
SNEC	Saxton Nuclear Experimental Corporation

Table 1  
Direct Measurement Comparison  
Containment Vessel Interior  
774' Elevation and below  
Saxton Nuclear Experimental Corporation  
Saxton, Pennsylvania

Location	ORISE Measurements (net cpm) <sup>a,b</sup>	SNEC Measurements (net cpm) <sup>a,c</sup>
Panel A1, Loc.8	-2	-3
Panel A2, Loc. 5	-23	6
Panel B2, Loc.12	6	7
Panel B5, Loc.13	-21	-9
Panel B7, Loc.5	4	12
Panel B8, Loc.6	12	23
Panel B9, Loc.7	35	8
Panel B9, Loc.15	1	-8
Panel B10, Loc. 16	14	0
Panel B13, Loc. 17	-2	20
Panel B16, Loc.11	-12	6

<sup>a</sup>Net cpm (counts per minute) calculated by subtracting shielded from unshielded measurement.

<sup>b</sup>Action level corresponding to the DCGL<sub>w</sub> of 2100 dpm/100 cm<sup>2</sup> was 410 net cpm.

<sup>c</sup>Action level corresponding to the DCGL<sub>w</sub> of 2100 dpm/100 cm<sup>2</sup> was 400 net cpm.

Table 2  
Split Sample Comparison  
Gamma Spectroscopy Results for  
Pulverized Steam Generating Station Debris  
Saxton Nuclear Experimental Corporation  
Saxton, Pennsylvania

ORISE Sample number	ORISE concentration (pCi/g)		SNEC Sample Number	SNEC concentration (pCi/g)	
	Cs-137 <sup>a</sup>	Co-60 <sup>a</sup>		Cs-137	Co-60
0968M001	0.05 ± 0.03 <sup>b</sup>	-0.01 ± 0.02	SX-SD-3401	0.081 ± 0.03 <sup>c</sup>	<0.046
0968M002	0.05 ± 0.02	0.00 <sup>d</sup> ± 0.02	SX-SD-3403	0.072 ± 0.03	<0.042
0968M003	0.05 ± 0.04	-0.01 ± 0.02	SX-SD-3404	0.101 ± 0.03	<0.05
0968M004	0.07 ± 0.02	0.02 ± 0.02	SX-SD-3405	0.081 ± 0.03	<0.047

<sup>a</sup>Minimum detectable concentrations for the analyses averaged 0.03 pCi/g.

<sup>b</sup>ORISE uncertainties are total propagated uncertainties at the 95% confidence level.

<sup>c</sup>SNEC reported 2 $\sigma$  uncertainty.

<sup>d</sup>Zero value is due to rounding.

## **Attachment 1**

### **ADDITIONAL COMMENTS ON THE FINAL STATUS SURVEY REPORT FOR THE SAXTON NUCLEAR EXPERIMENTAL CORPORATION CONTAINMENT VESSEL INTERIOR, 774' ELEVATION AND BELOW**

#### **NRC INSPECTION REPORT NO. 50-146/2003-201**

- 1) Executive Summary, Page 1, Paragraph 2: ESSAP recommends defining the purpose of the removable activity supplemental data. See MARSSIM Section 8.5.3.
- 2) Executive Summary, Page 1, Paragraph 2: ESSAP recommends that the exposure rate measurements performed be mentioned in this section as also being "supplemental" in nature.
- 3) Section 3.1.1.2: This section states that all static measurement results were less than 250 net cpm-the action level for scanning per calculation 6900-02-024. First, the action level should be changed to 580 net cpm for direct measurement comparison to the DCGL<sub>w</sub>. This change should also occur in Sections 3.1.2.2, 3.1.3.2, and 3.1.4.2.
- 4) Section 3.1.1.2: The table included in this section shows data for shielded and unshielded measurements with the net cpm difference calculated. As written, the data assessment appears to compare the net difference column to the DCGL<sub>w</sub> which is not consistent with MARSSIM guidance for data assessment when using the WRS Test. The last sentence in the section should be rewritten to discuss only the unshielded (gross) measurement results and how they compare to the DCGL<sub>w</sub>. The shielded and net difference columns should be removed from the table. These suggestions also apply to the remaining sections titled "Static Measurements." Per calculation E900-03-003, Section 4.14, shielded measurements were performed to correct background reference area ambient values to be consistent with the survey unit. Once the reference area measurements are corrected for the difference in the survey unit and reference area ambient backgrounds, additional shielded measurements are not required and including additional shielded measurement data could be confusing to the reader.
- 5) Sections 3.1.1.2 and 3.1.1.3: ESSAP recommends that the discussions in these sections should be reversed in order because QC smears are discussed before the smear survey results are discussed. This recommendation would apply to many sections throughout the document.
- 6) Section 3.1.5: ESSAP recommends adding a discussion of how the gamma spectroscopy data from the smears should be interpreted.
- 7) Section 3.5, Table: ESSAP recommends reporting the actual value of each gamma spectroscopy measurement with the minimum detectable concentration (MDC) reported using a standard background for the process or individually for each measurement.
- 8) Section 5.0, Paragraph 5: ESSAP suggests rewording the summary written as "be backfilled to at least the 774' elevation" to clarify that the containment vessel (CV) will be backfilled no higher than the 774' elevation.